MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

26 MAY 2017
3.00 P.M – 5.00 P.M
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **ALL** questions.

Question 1 [10 marks]

Solve the equations:

a. $\frac{4}{x-2} = \frac{-3}{x+5} + \frac{7}{(x+5)(x-2)}$ (4 marks)

b. $|1-2x| + 6 = 9$ (2 marks)

c. $\frac{3x+3}{x-1} < 2$ (4 marks)

Question 2 [10 marks]

Given the quadratic function $f(x) = x^2 + 6x + 9$

a. Find the vertex, the x-intercepts, the y-intercept, and the axis of symmetry of the graph of f. (5 marks)

b. Sketch the graph of $y = f(x)$. Show clearly the vertex, the x-intercepts, the y-intercept, and the axis of symmetry on the graph. (3 marks)

c. Determine the domain and the range of $f(x)$. (1 mark)

d. Determine the intervals where f is increasing or decreasing. (1 mark)

Question 3 [10 marks]

a. Given the functions $f(x) = x^2 - x + 2$ and $g(x) = \frac{x-2}{x+1}$.

i. Determine the domain of the functions f and g. (1 mark)

ii. Find the functions: $(f \circ g)(x)$ and $g^{-1}(x)$.
Simplify the answers. (5 marks)

b. Given that $(x+3)$ is a factor of $f(x) = x^3 + 2x^2 - 5x - 6$. Factorize $f(x)$ and solve the equation $x^3 + 2x^2 - 5x - 6 = 0$. (4 marks)

Continued...

Question 4 [10 marks]

a. Sketch the graph of the function $f(x) = \ln(x-3)$. Show clearly at least 2 points on the graph and the vertical asymptote. State the domain and range of the function f. (4 marks)

b. In the expansion of $(2x+3)^9$, find

i. the coefficient of x^7. (2 marks)

ii. the first three terms of the expansion. (4 marks)

Question 5 [10 marks]

a. Solve the equations:

i. $\ln(x+1) - \ln x = 2$ (3 marks)

ii. $\log_4 x^{\log_4 x} = 4$ (3 marks)

b. The sixth term and the tenth term of an arithmetic sequence are 40 and 112 respectively.

i. Find the first term and the common difference of the sequence. (3 marks)

ii. Find the twentieth term of the sequence. (1 mark)

End of Paper

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b M^p = p \log_b M$

$\log_b 1 = 0$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$S_n = \frac{n}{2}(2a_1 + (n-1)d) = \frac{n}{2}(a_1 + a_n)$

$a_n = a_1 r^{n-1}$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$